Jan. 26, 1943. A. E. DODD 2,309,174

INDICATING APPARATUS

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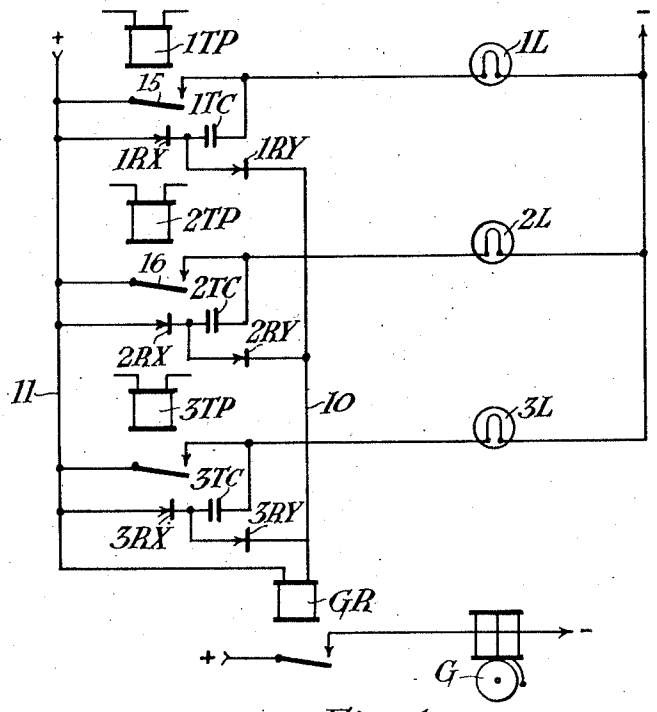


Fig. 1.

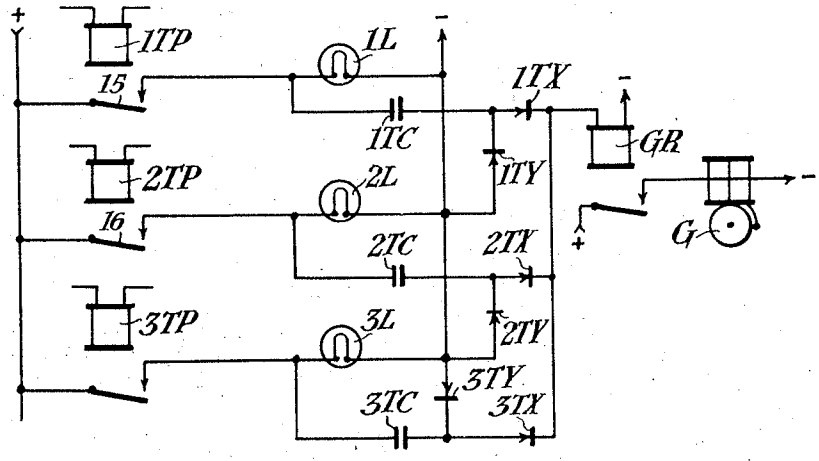


Fig. 2.

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INDICATING APPARATUS

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5 Claims. (Cl. 177—311)

My invention relates to indication apparatus, and particularly to apparatus of the type disclosed in United States Patent No. 2,168,805, issued August 8, 1939, to John M. Pelikan, and assigned to The Union Switch and Signal Company.

In some situations it is desirable to provide two types of indications of a change in a condition. For example, in a tower where railway signals are controlled it is desirable on entrance of a train into a track section to provide a momentary audible indication, and to also provide a visual indication, such as a light, which is continued as long as the track section is occupied.

In such installations there are usually several track sections occupancy of which is to be indicated, and it is desired in these situations to employ one single stroke bell to provide the audible indication on occupancy of any one of the various track sections, and to provide a separate lamp to supply the visual indication for each track section.

It is desired to arrange the equipment so that on entrance of a train into any track section the bell is operated to provide an audible signal, and so that the lamp for that section is lighted. It is desired also that the equipment for each track section be arranged so as not to interfere with that of the other track sections, and so that when a track section is vacated the equipment associated with that section will be conditioned for operation on subsequent occupation of the track section.

It is an object of this invention to provide improved means adapted for use in the manner described above.

A further object of the invention is to provide a system of the type described which requires only a single front contact of a relay to provide the proper control of both the audible and the visual signal.

A further object of the invention is to provide a system of the type described having a bell relay and a plurality of condensers which provide means to momentarily energize the bell relay, and having the equipment arranged so that only a single contact is required on each control relay to control both charging and discharging of a condenser and resultant operation of the bell relay.

Another object of the invention is to provide a system of the type described and having the equipment arranged in such manner that regardless of the number of condensers and control relays which are associated with one bell relay, each condenser will be effective to cause momentary operation of the bell relay, and so that the condensers will not detract from the effectiveness of each other.

A further object of the invention is to provide improved indication means.

Other objects of the invention and features of novelty will be apparent from the following description taken in connection with the accompanying drawing.

I shall describe two illustrative embodiments of my invention and shall then point out the novel features thereof in claims.

In the accompanying drawing,

Fig. 1 is a diagram showing one form of indication means provided by my invention, and,

Fig. 2 is a diagram showing another form of indication means which I may employ.

Similar reference characters refer to similar parts in each of the two views.

Referring to Fig. 1 of the drawing, there are shown therein control relays 1TP, 2TP and 3TP each of which is controlled by a condition, such as occupancy of a section of railroad track, not shown. Each of these relays is normally deenergized, and is energized on occupancy of the associated track section. The circuits of these relays are not shown, and the relays may be controlled in any manner well-known in the art.

Each control relay has associated therewith an electroresponsive device, here shown as a lamp L, for providing one indication, while other electroresponsive means, here shown as a single stroke bell G controlled by an auxiliary relay GR, is provided to give a second indication.

Each of the control relays has associated therewith a condenser TC from which energy is supplied to the relay GR as hereinafter explained, while the condensers have rectifiers or asymmetric units RX and RY associated therewith so that the condensers do not interfere with each other.

The equipment is shown in the drawing in the condition which it assumes when the various track sections are vacant. At this time the control relays TP are released and the circuits of the lamps L are interrupted, while the relay GR is released to interrupt the circuit of the bell G.

In addition, at this time the condensers TC are charged from a source of direct current the terminals of which are designated + and —. The circuit for charging the condenser 1TC is traced from the positive terminal of the source through the rectifier 1RX to one plate of the condenser, while the other plate of the condenser is con-

nected through the filament of lamp 1L to the negative terminal of the source. There is no flow of current in this circuit after the condenser becomes fully charged and accordingly the lamp is not lighted. The condensers 2TC and 3TC are charged by current supplied over similar circuits.

When a train enters a track section, as for example that with which relay 1TP is associated the contact 15 of relay 1TP closes and establishes a circuit to supply energy from the source to the lamp 1L and also establishes a circuit to supply energy from the condenser 1TC to the relay GR. The circuit for energizing the lamp 1L is obvious in the drawing. The circuit for supplying energy from the condenser 1TC to the relay GR is traced from one element of the condenser through the rectifier 1RY and wire 10 to one terminal of the winding of relay GR, while the other terminal of the relay GR is connected by wire 11 and the contact 15 of relay 1TP to the other element of the condenser. On establishment of this circuit energy stored in the condenser flows through the winding of the relay GR so that the contact of this relay picks up and establishes the circuit of the bell G and the bell is operated to provide a single audible signal of the fact that a track section has become occupied.

The energy supplied from the condenser 1TC to the relay GR soon decreases to a value insufficient to maintain the relay picked up and its contact releases and interrupts the circuit of the bell G so that the bell is conditioned for another operation.

As long as relay 1TP remains picked up, the lamp 1L continues to be lighted to provide a visual indication of occupancy of the track section, but when the section becomes vacated relay 1TP will release and will interrupt the circuit of the lamp 1L. In addition, release of relay 1TP will interrupt the connection from the positive terminal of the source to the condenser 1TC, and so the condenser will again be charged over the circuit which includes the lamp 1L in series therewith.

The operation of the equipment controlled by relays 2TP and 3TP is the same as that controlled by relay 1TP and a detailed description thereof is unnecessary.

The system provided by this invention is arranged so that if while one track section is occupied another becomes occupied the bell will ring to provide an audible indication of occupancy of the second track section.

If for example the section associated with relay 1TP is occupied so that relay 1TP is picked up, and the section associated with relay 2TP becomes occupied relay 2TP will pick up and its contact 16 will establish the circuit to supply energy from the condenser 2TC to the relay GR so that this relay will pick up and supply energy to the bell G.

At this time the rectifier 1RY serves to prevent flow of energy from the condenser 2TC to the condenser 1TC and accordingly all of the energy from the condenser 2TC is available to pick up the relay GR. If the rectifier 1RY were not provided energy from the condenser 2TC would be supplied to the condenser 1TC over a circuit which is traced from one element of the condenser 2TC through wire 10 to one element of the condenser 1TC, while the other elements of these condensers are connected together through the contact 16 of relay 2TP, wire 11 and contact 15 of relay 1TP. The rectifier 1RY prevents flow of energy from one element of the condenser 2TC through wire 11 to an element of condenser 1TC, and thereby prevents charging of the condenser 1TC from the condenser 2TC at these times. If this flow of energy from one condenser to another were permitted to occur too little energy might be supplied to the relay GR to pick up the relay.

In like manner the rectifiers 2RY and 3RY prevent charging of the associated condensers from the other condensers.

The rectifiers RX operate to prevent short circuiting of the condensers on picking up of the control relays. If these rectifiers were not provided, on picking up of the contact of a control relay a circuit would be established from the positively charged element of the associated condenser through the relay contact to the other element of the condenser. The rectifiers RX prevent flow of energy in this direction and accordingly prevent this short circuiting of the condensers which would otherwise occur.

The system shown in Fig. 1 has normally charged condensers and employs energy from these condensers to energize the bell control relay. The system shown in Fig. 2 is similar to that shown in Fig. 1 but differs therefrom in that it has normally uncharged condensers and employs the current required to charge these condensers to energize the bell control relay.

The equipment shown in Fig. 2 is shown in the condition which it assumes when the various track sections are vacant. At this time the control relays TP are released, thereby interrupting the circuits of the lamps L and of the condensers TC, while the bell control relay GR is released and interrupts the circuit of the bell G.

If a train enters the track section associated with control relay 1TP, contact 15 of this relay picks up and establishes the circuit of the lamp 1L, and also establishes a circuit to charge the condenser 1TC, this circuit including in series therewith the bell control relay GR. The circuit for lighting the lamp 1L is obvious in the drawing. The circuit for charging the condenser 1TC is traced from the positive terminal of the source through the contact of relay 1TP to one element of the condenser 1TC, while the other element of the condenser is connected through the rectifier 1TX to one terminal of the winding of the relay GR, the other terminal of which is connected to the negative terminal of the source. This other element of the condenser is also connected to the negative terminal of the source through the rectifier 1TY.

Accordingly, on picking up of the contact of relay 1TP the lamp 1L is lighted while the condenser 1TC is charged over a circuit which includes the relay GR in series therewith. As a result of the flow of energy in the circuit for charging the condenser 1TC the relay GR is energized and its contact picks up and establishes the circuit of the bell G so that the bell provides an audible indication of the fact that a track section has become occupied. When the condenser 1TC becomes charged the flow of energy in the circuit of the winding of relay GR ceases and this relay releases and interrupts the circuit of the bell G so that the bell is conditioned for another operation.

As long as the track section is occupied the relay 1TP is picked up and its contact 15 establishes the circuit of the lamp 1L so that the lamp provides a visual indication of the fact that the section is occupied. When the section is vacated the relay 1TP releases and interrupts the circuit of the lamp 1L and also interrupts the circuit

for charging the condenser 1TC so that energy is no longer supplied to the condenser, while the energy stored in the condenser discharges through a circuit which is traced from one terminal of the condenser through the lamp 1L, and thence through the rectifier 1TY to the other terminal of the condenser. Accordingly the condenser 1TC is discharged and is conditioned for a subsequent operation.

The equipment asociated with relays 2TP and 3TP operates in the same manner as that associated with relay 1TP and a detailed explanation thereof is unnecessary.

The system provided by this modification also operates so that when one track section is occupied the bell will be operated if another section becomes occupied.

When the section associated with relay 1TP is occupied relay 1TP is picked up and the lamp 1L is lighted, while the condenser 1TC is charged as it is connected across the source by a circuit which includes the relay GR in series therewith.

On subsequent picking up of contact 16 of the relay 2TP the circuit of the lamp 2L is established, while the condenser 2TC is connected across the source by a circuit which is traced from the positive terminal of the source through the contact 16 of relay 2TP to one terminal of the condenser, and from the other terminal of the condenser through the rectifier 2TX and the winding of relay GR to the negative terminal of the source. Accordingly, energy flows through the winding of relay GR and this relay picks up and establishes the circuit of the bell G so that the bell provides an audible signal.

When the condenser becomes charged the flow of energy through the winding of relay GR ceases and the relay releases and interrupts the circuit of the bell G.

As long as the track sections are occupied the relays 1TP and 2TP are picked up and the lamps 1L and 2L are lighted while the condensers 1TC and 2TC remain charged. When these sections are vacated the relays 1TP and 2TP release and interrupt the circuits of the lamps and of the condensers so that the lamps are extinguished and the condensers discharge as explained above.

The rectifiers employed in the modification shown in Fig. 2 are arranged to insure proper operation of the equipment under all conditions. The rectifier 1TY is poled so as to permit the condenser 1TC to discharge through the lamp 1L on release of the relay 1TP. This rectifier is also poled so that on picking up of the relay 1TP the energy to charge the condenser must flow through the winding of relay GR so that this relay will pick up.

Similarly the rectifiers TX insure that all of the energy for charging each of the condensers flows through the winding of the relay GR and is not supplied through the other condensers. If, for example, the rectifiers 2TX and 3TX were not provided a connection would be established from the negative side of the condenser 1TC through condenser 2TC and lamp 2L to the negative terminal of the source, while a similar connection would be established through condenser 3TC and lamp 3L, and on picking up of the relay 1TP a portion at least of the energy for charging the condenser 1TC would be supplied over these connections and not through the winding of relay GR. If this were permitted to occur the energy supplied through the relay GR might be insufficient to pick up the relay.

From the foregoing it will be seen that this invention provides an improved indication system which operates to provide a momentary audible indication and a continuing visual indication, and also that the system is arranged so that only a single contact on the control relay is required. In the systems shown in the drawing the circuits are arranged so that each includes a front contact of a control relay so that the indications are provided when the control relays are picked up. However, it should be understood that these circuits might be arranged to include only a back contact of the control relays so that the indications are provided when the control relays are released.

The fact that the indication means provided by this invention necessitates the use of but a single contact on the control relay is a distinct advantage as these relays usually have a limited number of contacts and these contacts are required for other purposes.

In addition it will be seen that in each of the two modifications there is a condenser and two electro-responsive devices, namely a lamp and the auxiliary relay. In each of the two modifications the condenser is charged by energy supplied over a circuit including in series therewith one of the electroresponsive devices, while the condenser is discharged over a circuit including the other of the two devices. In each of the two modifications one of these circuits has an asymmetric unit included in series therewith to thereby insure flow of current through the auxiliary relay on closing of the control relay contact, while each modification also has asymmetric units included in the circuits of the auxiliary relay to prevent energy intended for this relay from being diverted to one of the condensers.

While the two modifications of the invention have been illustrated and described as employing three control relays so that indications may be provided for three track sections, it should be understood that either a smaller or a larger number of control relays may be employed if indications for a different number of track sections are required.

Likewise, while the equipment has been described as providing means to indicate occupancy of a section of railroad track, it should be understood that the invention is not limited to use for this purpose, but may be employed wherever indication means of this type is desirable.

In addition, while the equipment has been illustrated and described as employing a lamp to provide one form of indication and a bell to provide a different form of indication, the invention is not limited to the use of these devices and any desired form of indication means may be employed.

Similarly, while in the systems shown in the drawing, charging or discharging of a condenser energizes an auxiliary relay which controls the circuit of the bell, the invention is not limited to this arrangement, and it is contemplated that the auxiliary relay might be omitted and the bell energized directly from the condensers.

Although I have herein illustrated and described only two forms of indication apparatus embodying my invention, it is understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

1. In combination, a source of direct current,

an indication device, a plurality of circuits connected across the terminals of said source, each circuit including in series therewith a lamp and a normally open control contact, each circuit having associated therewith a condenser having one of its terminals connected to said circuit at a point intermediate the lamp and the control contact, each condenser having its other terminal connected through an asymmetric unit to one terminal of said indication device and also through another asymmetric unit to the other terminal of said indication device, one of the asymmetric units associated with each circuit being arranged to permit energy to flow from the indication device terminal to the condenser and the other asymmetric unit associated with each circuit being arranged to permit energy to flow from the condenser terminal to the indication device terminal, and a connection from one terminal of said source to one terminal of said indication device, whereby when one of said control contacts is closed the lamp associated with said control contact is lighted and a circuit including in series therewith the condenser and the indication device is established and the indication device is momentarily energized during flow of current in such circuit.

2. In combination, a source of direct current, an indication device, a plurality of lamps each having its first terminal connected to one terminal of said source and each having its second terminal connected through a normally open control contact to the other terminal of the source, a condenser associated with each lamp, each condenser having one of its terminals connected to the second terminal of the associated lamp, each condenser having its other terminal connected through a first asymmetric unit to one terminal of the indication device and also connected through a second asymmetric unit to the other terminal of said indication device, one of said asymmetric units being poled to permit energy to flow from the condenser to the indication device and the other asymmetric unit being poled to permit energy to flow from the indication device to the condenser, and a connection from one terminal of said source to one terminal of said indication device.

3. In combination, a source of direct current, a first indication device, a plurality of second indication devices each having its first terminal connected to one terminal of the source and having its second terminal connected through a normally open control contact to the other terminal of the source, each of said second indication devices having associated therewith a condenser having one of its terminals connected to the second terminal of the associated second indication device, each condenser having its other terminal connected through a first asymmetric unit to one terminal of the first indication device and also to one terminal of the source, said other terminal of each condenser also being connected through a second asymmetric unit to the other terminal of the first indication device, one of said asymmetric units being poled to permit energy to flow to the associated condenser terminal and the other of said asymmetric units being poled to permit energy to flow from the associated condenser terminal.

4. In combination, a source of direct current, a first indication device, a plurality of second indication devices each having its first terminal connected to the negative terminal of the source and having its second terminal connected through a normally open control contact to the positive terminal of the source, each of said second indication devices having associated therewith a condenser having one of its terminals connected to the second terminal of the associated second indication device, each condenser having its other terminal connected through a first asymmetric unit to one terminal of the first indication device and also to the positive terminal of the source, said other terminal of each condenser also being connected through a second asymmetric unit to the other terminal of said first indication device, each first asymmetric unit being poled to permit energy to flow to the condenser terminal, whereby the condenser is normally charged over a circuit which includes said first asymmetric unit and the associated second indication device in series therewith and whereby each condenser is prevented from discharging through the other condensers, each second asymmetric unit being poled to permit energy to flow from the condenser terminal, whereby on closure of the control contact associated with said condenser the condenser may discharge through a circuit including in series therewith the second asymmetric unit and the first indication device, and on closure of another of said control contacts the condenser associated with that contact is prevented from discharging through the condenser with which said asymmetric unit is associated.

5. In combination, a source of direct current, a first indication device, a plurality of second indication devices each having its first terminal connected to the negative terminal of said source and having its second terminal connected through a normally open control contact to the positive terminal of the source, each of said second indication devices having associated therewith a condenser having one of its terminals connected to the second terminal of the associated second indication device, each condenser having its other terminal connected through a first asymmetric unit to the negative terminal of the source and also to one terminal of the first indication device, said other terminal of each condenser also being connected through a second asymmetric unit to the other terminal of said first indication device, each first asymmetric unit being poled to permit energy to flow to the condenser terminal whereby energy stored in the condenser may discharge through the associated second indication device and said first asymmetric unit but energy to charge said condenser is prevented from being supplied to the condenser through the circuit including said first asymmetric unit, each second asymmetric unit being poled to permit energy to flow from said condenser terminal, whereby on closure of the control contact associated with said condenser the condenser is charged by energy supplied over the circuit which includes the first indication device in series therewith and on closure of another of the control contacts energy to charge the condenser associated with that contact is prevented from being supplied through the condenser with which said asymmetric unit is associated.

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